METHODS OF MAKING A READ SENSOR
WITH SELECTIVELY DEPOSITED LEAD LAYERS

ABSTRACT OF THE DISCLOSURE

Methods of making a read sensor with a selectively deposited lead layers are disclosed. In one illustrative example, the method includes the acts of forming a plurality of read sensor layers over a wafer; forming a monolayer photoresist to mask the plurality of read sensor layers in a central region; ion milling to remove the unmasked plurality of read sensor layers in side regions to thereby form a read sensor in the central region; depositing longitudinal bias layers in the side regions; and depositing a silicon reactant layer over the longitudinal bias layers in the side regions. After removing the monolayer photoresist, a silicon reduction process and a hydrogen reduction process are sequentially performed for the selective depositions of the lead material. In the silicon reduction process, tungsten hexafluoride (WF_6) and argon (Ar) gases are passed over the wafer to thereby selectively deposit a relatively thin W film only on the Si reactant layer in the side regions through the following chemical reaction: $2WF_6 + 3Si \rightarrow 2W + 3SiF_4$. In the hydrogen reduction process, WF_6 and hydrogen (H_2) gases are passed over the wafer to thereby selectively deposit a relatively thick W film only on the W film in the side regions through the following chemical reaction: $WF_6 + 3H_2 \rightarrow W + 6HF$.